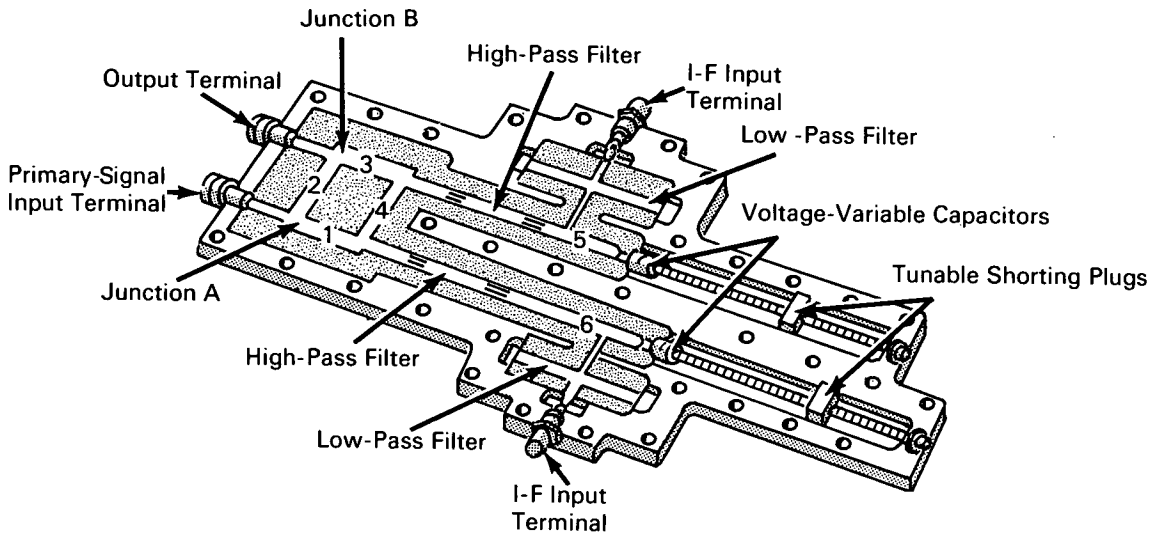
NASA TECH BRIEF

Compact Microwave Mixer Has High Conversion Efficiency



The problem:

To design a compact, lightweight microwave mixer that will have a relatively high conversion efficiency and power output.

The solution:

A mixer employing a pair of back-to-back voltage-variable capacitors in a stripline network.

How it's done:

The mixer includes a branchline hybrid composed of branches 1, 2, 3, and 4; a pair of parallel stripline circuits 5 and 6, which include a high-pass filter in each stripline; a pair of voltage-variable capacitors, each connected in a back-to-back relationship at one end of the parallel striplines; and low-pass filters connected by stripline to the parallel striplines.

In operation, a primary frequency signal, applied to the input terminal, passes to branch 1 of the branchline hybrid. The hybrid splits the input signal, providing 2 signals which are 90 degrees out of phase. These out-of-phase signals are applied to the parallel stripline circuits (5 and 6). One of the parallel striplines (for example stripline 6) is a quarter wavelength longer than the other so that the signals are in phase at the ends of the striplines. Intermediate-frequency signals are applied through the low-pass filters to the voltage-variable capacitors at the ends of the parallel striplines (5 and 6). As a result of the heterodyne effect produced by the voltage-variable capacitors, the signals are reflected back down the parallel striplines. These signals include the high and low sidebands of the primary input signal. The reflected sidebands are passed by the high-pass filters, but rejected by the low-pass filters, thereby reaching the branchline hybrid (1, 2, 3, 4). Because of differences in electrical paths and

(continued overleaf)

phases, the sidebands are cancelled at junction A. However, the sidebands are reinforced at junction B, from where they pass to the output terminal. The two tunable shorting plugs may be varied over a selected frequency range to optimize the output level of the voltage-variable capacitors.

Note:

Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Goddard Space Flight Center
Greenbelt, Maryland 20771
Reference: B66-10625

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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of Hughes Aircraft Company,
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